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November 25, 2013 Project No. 4980

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Re: Clearwater Paper Corporation in Lewiston, Idaho -- Pre-Test feasibility study Pursuant to EPA Request for Information, July 19, 2013

On behalf of Clearwater Paper Corporation (CLW) Horizon Engineering submits this field planning document for a pre-testing feasibility study for the above-referenced facility beginning the week of December 2nd, 2013.

1. **Sources:** Internal process points associated with the M&D No. 1 and M&D No. 2 Digesters

2. **Tentative Pre-Test Study Locations:**[1]
   - Sample Point 1a M&D No. 1: Exhaust to Kone Bin
   - Sample Point 2a M&D No. 1: Exhaust to Kone Bin
   - Sample Point 3a M&D No. 1: Secondary Exhaust from the Rotary Valve to the Exhaust Chamber
   - Sample Point 4a M&D No. 1: Exhaust line from Drop Chute to Exhaust Chamber
   - Sample Point 1b M&D No. 2: Exhaust to Kone Bin
   - Sample Point 2b M&D No. 2: Exhaust to Kone Bin
   - Sample Point 3b M&D No. 2: Secondary Exhaust from the Rotary Valve to the Exhaust Chamber
   - Sample Point 4b M&D No. 2: Exhaust line from Drop Chute to Exhaust Chamber

[1] The feasibility study will focus on the four sample points from one of the M&D Units. It will be assumed that the other M&D Unit sample points will be similar in characteristics.

3. **Purpose of the Study:** To determine if future testing can be done for Compliance with the RFI and extension granted on August 28, 2013.

4. **Process Description:** The sawdust pulping system includes two M&D continuous digesters, each operating at approximately 250 ADT/day of equivalent bleached pulp production. Two sawdust storage silos pneumatically feed sawdust to the top of a cyclone separator, where the wood and transport air are separated. On each line, the wood drops into a storage vessel known as the Kone bin, located below the cyclone. Each Kone bin typically contains 10 to 15 feet of wood during normal operation.

   On each line, sawdust gravity feeds from the Kone bin into a metering screw, which feeds a rotary inlet valve known as the Bauer valve, before dropping into the digester itself. The rotary inlet valve contains 10 pockets. As the pockets rotate they are sealed against the casing of the valve. The seal prevents back-flow from the pressurized digester vessel.

   Fresh steam is used in each rotary inlet valve to heat the sawdust, to pressurize the valve pockets, and to help push sawdust out of the valve pockets to purge the pocket. Sawdust then falls by gravity into the digester vessel. The majority of this steam is either discharged into the digester vessel with the sawdust, or is recycled from the discharge side of the valve to the inlet side of the valve via the primary exhaust line. Secondary exhaust from each rotary inlet valve flows to an exhaust chamber, where it is sprayed with a condensing shower of mill water. Any remaining material not condensed and injected into the sawdust through the metering screw will move through two lines into the bottom of the Kone bin. In addition to the secondary exhaust line, a line from the drop chute between the metering screw and the rotary inlet valve also flows to the exhaust chamber. (See Figure 1)

   Once the wood enters the digester it falls onto a midfeather separating plate, where it is confined between constantly moving flights. The flights carry the sawdust down the top side of the midfeather, around the lower end of the digester, and then up the bottom half of the divided digester. When the sawdust reaches the top of the digester, it exits out of the discharge nozzle (on the bottom side of the digester) and falls into the surge tube, before going on to the blow tank. From the blow tank the sawdust pulp is washed and screened, prior to a final bleaching operation.

   Figure 1 shows the process along with identification of the installed sampling points.

5. **Process Mode of Operation During Study**: The operating mode during the feasibility study will be at normal operating rates and conditions. The pulp from these digesters will be processed through a 4-stage brownstock washing line, and then through a 4-stage bleach plant. The pulp will be used in the manufacture of bleached paperboard.

6. **Constituents proposed to be Tested per the ICR request:** Methanol and TRS.[2]

7. **Test Methods Proposed in original test plan:** The field pre-test evaluation is to be conducted to determine the suitability of testing according to the following methods:

   Sample Points 1a and 2a (M&D No.1) and 1b and 2b (M&D No.2):

Flow Rate:	EPA Methods 1A and Modified 2C (S- pitot flow traverses of duct <12")[3]
CO_2 and O_2:	Assume ambient molecular weight 28.96
Moisture:	EPA Method ALT-008 (midget impinger catch incorporated with EPA Method 308)
Methanol:	EPA Method 308 (sorbent tube and midget impinger with analysis by GC/FID)
TRS:	ASTM D5504-08 (silonite coated Summa canister with analysis by GC/SCD)

   Sample Points 3a and 4a (M&D No.1) and 3b and 4b (M&D No.2):

Flow Rate:	EPA Methods 1A and 2D (calibrated orifice plates)
CO_2 and O_2:	Assume ambient molecular weight 28.96
Moisture:	EPA Method ALT-008 (midget impinger catch incorporated with EPA Method 308)
Methanol:	EPA Method 308 (sorbent tube and midget impinger with analysis by GC/FID)

8. **Pre-test actions:** Work will be done and observations will be recorded at each of the four locations on one of the M&D systems. We are very interested to determine if there is any dry gas at the sample locations and to determine how much the presence of sawdust will affect sampling. During the field study, method modifications may be attempted to collect a sample and flow. Any modifications will be documented. At a minimum we plan to attempt to gather or assess the following information:

   - Dry bulb temperatures
   - Wet bulb temperatures
   - Static pressures
   - Ability to collect Summa canisters in a conventional or non-conventional way for ASTM D5504-08 analysis
   - Ability to collect EPA Method 308 samples in a conventional or non-conventional way
   - Ability to do EPA flow rates and what modifications may be necessary for future measurements.

   Detailed notes will be recorded and photos taken of observations

[2] TRS compounds analyzed will be dimethyl disulfide, dimethyl sulfide, hydrogen sulfide, and methyl mercaptan.

[3] Modified to use a S-type pitot because it is expected that a p-type pitot may plug due to the presence of sawdust and the moisture content of the gas stream.

9. **Horizon Engrg. Contacts:** David Bagwell or
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12. **Plant Entry & Safety Requirements:** The Horizon team will follow internal safety policies and abide by any site specific safety and entry requirements.

13. **Responsibilities of Horizon Personnel:** The Horizon team will consist of one Project Manager and two Technicians.

14. **Tentative Study Schedule:**

Day 1: Mobilize
Day 2: Begin evaluation
Day 3: Continue evaluation
Day 4: Complete evaluation and demobilize

15. **Other Considerations:** None

16. **Administrative Notes:**

A findings report will be prepared within 30 days after the field work is completed. Per EPA request we plan to include the following information:

- A recommendation regarding the technical feasibility of testing for each of the eight proposed sampling locations.
- Descriptions of all mitigative measures proposed to facilitate the testing.
- Any proposed modification to EPA reference test methods.
- All testing and process data collected during the pre-test feasibility evaluation.
- Analysis and description explaining how the data collected supports the testing feasibility recommendation for each sampling point.

CLW will send one (1) hardcopy of the completed feasibility report to you at the address above.

Any questions or comments relating to this feasibility plan should be directed to me.

Sincerely,

David Bagwell, QSTI
Managing Member
Horizon Engineering, LLC

cc: Rick Wilkinson, Clearwater Paper Corporation
Marv Lewallen, Clearwater Paper Corporation
Bob Pernsteiner, Clearwater Paper Corporation